EFFECTS OF CONSTRUCTION AND STAGED FILLING OF RESERVOIRS ON THE ENVIRONMENT AND ECOLOGY

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COLOR ILLUSTRATIONS REPRODUCED IN BLACK AND WHITE

TYPE II PROGRESS REPORT (For the period 9 December 1972 to 8 June 1973)

TITLE: Effect of Construction and Staged Filling of Reservoirs on the Environment and Ecology MMC #341

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OBJECTIVE:

To study the environmental and ecological impact of the construction and operation of Oakley Dam and Friends Creek Impoundment located on the Sangamon River in East Central Illinois.

INTRODUCTION:

Most of the research effort during this six month report period was directed toward the development of operational procedures for the project and testing the systems to be used in the investigation. Digitized planimetric base maps were photogrammetrically produced from aircraft photography. These planimetric base maps are used in conjunction with the Harvard SYMAP program to provide the base maps for the interpretation of the ERTS imagery. ERTS imagery has been enlarged and enhanced using Eastman Kodak Photomicrography color film #2483. In the future, tonal slicing techniques using Agfacontour film will be used to enhance the imagery for analysis. Computer-generated overlay maps will be used for change detection. Interpretations and ground truth from time one and time two will be computer-mapped, overlayed, and only the classes showing change will be printed out. There has been some problem regarding the collection of ground truth data as the floodplains in the study area have been inundated for a considerable part of the growing season.

REPORT:

Due to the uncertainties presently facing the Springer Lake - Friends Creek reservoir project it is doubtful the construction and operation of the reservoir will occur within the lifetime of this ERTS-1 contract. Consequently, the major emphasis of this investigation is being centered on the development of the technical procedures necessary for the enhancement and analysis of the ERTS imagery to meet the original objectives of the study.

A new data analysis plan was prepared and submitted during this report period. Utmost consideration was given to making the plan simple to execute and repeat for all three phases of the construction program, before, during, and after the construction of the reservoir.

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Numerous tests were conducted by the University of Illinois personnel to determine the time, equipment, and software requirements of the investigation. The new data analysis plan was developed with the following priorities:

a. The first priority is the sensitivity check of satellite versus aircraft imagery. The ERTS imagery will be enhanced to increase the retrievable information.

b. The second priority is to compare ground truth data with both the aircraft and ERTS images to establish interpretation classes.

c. The third priority is the change detection system.

d. The prediction model building stage is given the last priority as it is dependent on the completion of the reservoir construction project.

The computer mapping program is fully operational. Base maps for interpretation are produced by interfacing the Version V, Harvard SYMAP program, with the digital output of the stereoplotter used in the photogrammetric phases of the project.

Using a Wild A7 stereoplotter, University of Illinois personnel produced a digital planimetric map of one of the stereomodels of underflight photography. This map provided the input to the SYMAP program for this particular model. In the future, digital planimetric maps of other stereomodels of aircraft photography will be produced and placed in the SYMAP program. These digital planimetric models will then be connected together to form a continuous strip.

Contour maps to detect changes in surface configuration will be produced on a first-order stereoplotter using photographs from successive underflights. The actual changes in surface configuration will be detected by fitting mathematical surfaces to the surface configuration in time one and time two and determining the differences.

To manually interpret the ERTS imagery, it was deemed necessary to enlarge and enhance the images. The enlargement and preliminary enhancement of ERTS images was accomplished by using Eastman Kodak Photomicrography color film #2483, an example is on the final page of this report. This film's high contrast, full color saturation and extremely fine definition makes it ideal for copying and enlarging ERTS images. In the future, tonal slicing techniques using Agfacontour film will be used to further enhance ERTS images. In the event this film cannot be obtained, alternative procedures for tonal slicing will be investigated and implemented.

The initial design of a computer program to do overlay maps for change detection has been accomplished. The overlay technique is a simplistic type of change detection operation and it is fast and economical. Ground truth and interpretations from time one and time two will be computer-mapped, overlayed, and only classes showing change will be printed out.

A common base map is being developed for recording ground truth data as well as for interpretation. The map will cover the entire Sangamon River floodplain from Rantoul to Springfield, Illinois. The use of this map by all parties involved in the project will simplify the transfer and use of the ground truth data.

In the future, two aspects of the project need to be refined and finalized before the mass production phase of this project can commence.

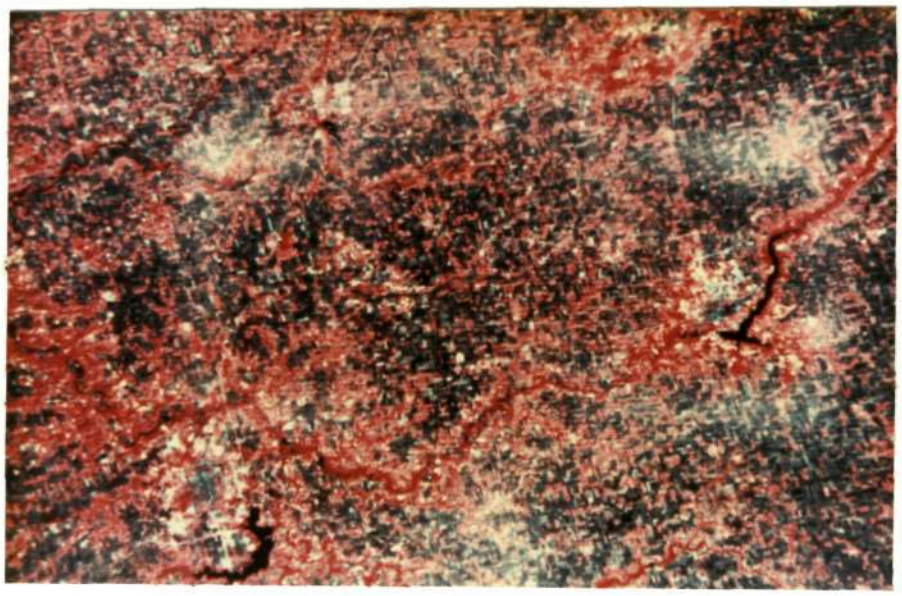
a. The photographic copying and enhancement procedures will have to be systemized, emphasis will be placed on the development of an additive slide copying system.

b. The procurement of the Agfacontour film has experienced difficulties since it was first ordered on November 17, 1972. When the film is received, experimentation with the Agfacontour film will be necessary to develop efficient operational procedures. If this film cannot be acquired, alternative tonal slicing procedures will be considered for enhancing the imagery.

Concurrent efforts will be devoted to the completion of the planimetric base map covering the Sangamon River floodplain.

After the preceding three items have been completed, research efforts will be directed to systematically process and analyze ERTS and underflight imagery and to correlate the interpretation with ground truth data. This analysis will be undertaken for each set of ERTS and underflight time-paired imagery available for the study area. ERTS imagery obtained between these time periods will be analyzed for change.

Completion and testing of the change detection overlay program is expected to be completed in the near future. To date, the investigation has been in the development stage and it is too early to draw any conclusions, favorable or unfavorable, regarding the work completed on the project.



Magnification 1.2 times from original 9x9" ERTS imagery

Magnification 3.8 times from original 9x9" ERTS imagery

Figure 1. Samples of High Contrast Color Copies of ERTS imageries Produced Using Eastman Kodak Photomicrography Color Film #2483